

EC2600
 Winter 2002
 Homework Assignment #4

1. P.6-3

2. P.6-13

3. P.6-22

a. $H_z = nI$, $\vec{B} = \begin{cases} \hat{z}\mu nI, & r < a \\ \hat{z}\mu_o nI, & a < r < b \end{cases}$, $\vec{M} = \begin{cases} \hat{z}(\mu/\mu_o - 1)nI, & r < a \\ 0, & a < r < b \end{cases}$

b. $\vec{J}_m = 0$, $\vec{J}_{ms} = \hat{\phi}(\mu/\mu_o - 1)nI$

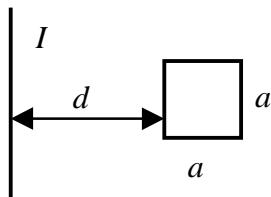
4. P.6-28

a. Φ for center leg = 3.57×10^{-4} Wb, Φ for left leg = 1.79×10^{-4} Wb

b. H in right or left leg = 28.5 A/m, H in center leg air gap = 28.4×10^4 A/m
 H in center leg material = 57.0 A/m

5. Find the mutual inductance between an infinite straight wire and a square loop of radius a at a distance d from the wire.

$$\frac{\mu_o a}{2\pi} \ln\left(\frac{d+a}{d}\right) H$$



6. P.6-41 (Hint for (a): write W in terms of $x = I_1/I_2$ and then take the derivative with respect to x to get the minimum.)